

1/29 #7



OIPE

RAW SEQUENCE LISTING

DATE: 01/29/2002

PATENT APPLICATION: US/09/716,964A

TIME: 14:19:54

Input Set : A:\R10301.app

Output Set: N:\CRF3\01292002\I716964A.raw

P5

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3 <110> APPLICANT: O'Donnell, Michael E.
4 Yuzhakov, Alexander
5 Yurieva, Olga
6 Jeruzalmi, David
7 Bruck, Irina
8 Kuriyan, John
10 <120> TITLE OF INVENTION: ENZYMES DERIVED FROM THERMOPHILIC ORGANISMS THAT
11 FUNCTION AS A CHROMOSOMAL REPLICASE, PREPARATION AND
12 USE THEREOF
14 <130> FILE REFERENCE: 22221/1030
16 <140> CURRENT APPLICATION NUMBER: 09/716,964A
17 <141> CURRENT FILING DATE: 2000-11-21
19 <150> PRIOR APPLICATION NUMBER: 60/143,202
20 <151> PRIOR FILING DATE: 1997-04-08
22 <150> PRIOR APPLICATION NUMBER: 08/823,407
23 <151> PRIOR FILING DATE: 1997-04-08
25 <150> PRIOR APPLICATION NUMBER: 09/057,416
26 <151> PRIOR FILING DATE: 1998-04-08
28 <160> NUMBER OF SEQ ID NOS: 212
30 <170> SOFTWARE: PatentIn Ver. 2.1
32 <210> SEQ ID NO: 1
33 <211> LENGTH: 2007
34 <212> TYPE: DNA
35 <213> ORGANISM: Thermus thermophilus
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39 gccacctoct ccaggggggc caaggcgtgc aaggagagga acgtccgcac cacgccctat 120
40 actagccttg tgagcgccct ctaccgcgcg ttcgcgcgcc tcacctcca ggaggtggtg 180
41 gggcaggagc acgtgaagga gccctcctc aaggccatcc gggaggggag gctcgcccag 240
42 gcctacctct tctccggggc caggggcgtg ggcaagacca ccacggcgag gctcctcgcc 300
43 atggcggttg ggtgccaggg ggaagacccc ccttgcgggg tctgccccca ctgccaggcg 360
44 gtgcagaggg gcgcccaccc ggacgtggtg gacattgacg ccgccagcaa caactccgtg 420
45 gaggacgtgc gggagctgag ggaagggatc cactcgccc ccctctctgc cccaggaag 480
46 gtcttcatcc tggacgaggg ccacatgctc tccaaaagcg ccttcaacgc cctcctcaag 540
47 accctggagg agcccccgcc ccacgtcctc ttctgtcttg ccaccaccga gcccgagagg 600
48 atgcccccca ccatcctctc ccgcacccag cacttccgct tccgcgcctt cacggaggag 660
49 gagatcgctt ttaagctccg gcgcatactg gaggcggtg ggcgggaggc ggaggaggag 720
50 gccctcctcc tctcgccccg cctggcgagc ggggccccta gggacgcgga aagcctcctg 780
51 gaggccttcc tctccttgga aggccccctc acccggaagg aggtggagcg cgccctaggc 840
52 tccccccag ggaccggggg ggccgagatc gccgcctccc tcgcgagggg gaaaacggcg 900
53 gaggcccttg gcctcgcccc gcgcctctac ggggaagggt acgccccgag gagcctggtc 960
54 tcgggccttt tggaggtgtt ccgggaaggc ctctacgcg ccttcggcct cgcggaacc 1020
55 ccccttcccg ccccgcccca ggccctgatc gccgccatga ccgccttga cgaggccatg 1080

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56 gagcgccctcg cccgccgctc cgacgcctta agcctggagg tggccctcct ggaggcgagg 1140
57 agggcccttg cgcgcgaggc cctaccccag cccacggggc ctccttcccc agaggtcggc 1200
58 cccaagccgg aaagcccccc gaccccgga cccccaaggc ccgaggaggc gcccgacctg 1260
59 cgggagcggt ggcgggcctt cctcgaggcc ctcaggccca ccctacgggc cttcgtgcgg 1320
60 gagggccgccc cggaggtccg ggaaggccag ctctgcctcg ctttccccga ggacaaggcc 1380
61 ttccactacc gcaaggcctc ggaacagaag gtgaggctcc tccccctggc ccaggcccat 1440
62 ttcggggtgg aggaggtcgt cctcgtcctg gagggagaaa aaaaaagcct gagcccaagg 1500
63 ccccgcccgg cccacacctc tgaagcgccc gcacccccgg gccctcccga ggaggaggta 1560
64 gaggcggagg aagcggcgga ggaggccccg gaggaggcct tgaggcgggt ggtccgcctc 1620
65 ctggggggggc ggggtgctct ggtgcggcgg cccaggaccc gggaggcgcc ggaggaggaa 1680
66 cccctgagcc aagacgagat agggggtact ggtatataat gggggcatga cgcggaccac 1740
67 cgacctcgga caagagaccg tggacaacat cctcaagcgc ctccgcgta ttgaggcca 1800
68 ggtgcggggg ctccagaaga tggtgccga gggccgccc tgcgacgagg tcctcaccca 1860
69 gatgaccgcc accaagaagg ccatggaggc ggcggccacc ctgatcctcc acgagttcct 1920
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71 cgccaccatg ctgaagaact tcattcta 2007
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75 <211> LENGTH: 529
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77 <213> ORGANISM: Thermus thermophilus
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83 Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
84 20 25 30
86 Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
87 35 40 45
89 Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
90 50 55 60
92 Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
93 65 70 75 80
95 Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
96 85 90 95
98 Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
99 100 105 110
101 Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
102 115 120 125
104 Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
105 130 135 140
107 His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
108 145 150 155 160
110 Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
111 165 170 175
113 Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
114 180 185 190
116 Glu Ala Glu Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly
117 195 200 205
119 Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
120 210 215 220

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122 Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
123 225      230      235      240
125 Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
126      245      250      255
128 Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
129      260      265      270
131 Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
132      275      280      285
134 Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln
135      290      295      300
137 Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu
138 305      310      315      320
140 Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala
141      325      330      335
143 Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro
144      340      345      350
146 Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro
147      355      360      365
149 Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe
150      370      375      380
152 Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg
153 385      390      395      400
155 Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys
156      405      410      415
158 Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro
159      420      425      430
161 Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu
162      435      440      445
164 Gly Glu Lys Lys Ser Leu Ser Pro Arg Pro Arg Pro Ala Pro Pro Pro
165      450      455      460
167 Glu Ala Pro Ala Pro Pro Gly Pro Pro Glu Glu Glu Val Glu Ala Glu
168 465      470      475      480
170 Glu Ala Ala Glu Glu Ala Pro Glu Glu Ala Leu Arg Arg Val Val Arg
171      485      490      495
173 Leu Leu Gly Gly Arg Val Leu Trp Val Arg Arg Pro Arg Thr Arg Glu
174      500      505      510
176 Ala Pro Glu Glu Glu Pro Leu Ser Gln Asp Glu Ile Gly Gly Thr Gly
177      515      520      525

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179 Ile

183 <210> SEQ ID NO: 3

184 <211> LENGTH: 1590

185 <212> TYPE: DNA

186 <213> ORGANISM: Thermus thermophilus

188 <400> SEQUENCE: 3

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190 cacgtgaagg agcccctcct caaggccatc cgggagggga ggctcgccca ggcctacctc 120
191 ttctccgggc ccaggggcgt gggcaagacc accacggcga ggctcctcgc catggcgggtg 180
192 ggggtgccagg ggaagacccc cccttgccgg gtctgcccc actgccaggc ggtgcagagg 240
193 ggcgccccacc cggacgtggt ggacattgac gccgccagca acaactccgt ggaggacgtg 300

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194 cgggagctga gggaaaggat ccacctcgcc cccctctctg cccccaggaa ggtcttcac 360
195 ctggacgagg cccacatgct ctccaaaagc gccttcaacg cctcctcaa gacctggag 420
196 gagccccgcg cccacgtcct ctctgtcttc gccaccaccg agcccgagag gatgcccccc 480
197 accatcctct cccgcaccca gcacttcgcg ttccgcccgc tcacggagga ggagatcgcc 540
198 tttaagctcc ggcgcacatc ggaggccgtg gggcgggagg cggaggagga ggccctcctc 600
199 ctctcgcgcc gcctggcgga cggggccctt agggacgcgg aaagcctcct ggagcgcttc 660
200 ctctcctcgg aaggccccct cacccggaag gaggtggagc gcgcctagg ctccccccca 720
201 gggaccgggg tggccgagat cgccgcctcc ctcgcgaggg ggaaaacggc ggaggccctg 780
202 ggccctcgcc ggcgcctcta cggggaaggg tacgccccga ggagcctggt ctcgggcctt 840
203 ttggagggtg tccgggaagg cctctacgcc gccttcggcc tcgcgggaa cccccctccc 900
204 gccccgcccc aggcctgat cgccgccatg accgcctgg acgaggccat ggagcgcttc 960
205 gcccgcgcgt ccgacgcctt aagcctggag gtggccctcc tggaggcggg aagggcctg 1020
206 gccgcccagg ccctacccca gccacgggc gctccttccc cagaggtcgg cccaagccg 1080
207 gaaagcccc cgaccccgga accccaagg cccgaggagg cggccgacct gcgggagcgg 1140
208 tggcgggcct tcctcgaggc cctcaggccc accctacggg ccttcgtgcg ggaggcccg 1200
209 ccggagggtc gggaaaggcca gctctgcctc gctttccccg aggacaaggc ctccactac 1260
210 cgcaaggcct cggaacagaa ggtgaggctc ctccccctg cccaggccca ttctggggtg 1320
211 gaggagggtc tcctcgtcct ggaggagaa aaaaaagcc tgagcccaag gccccgccc 1380
212 gccccacctc ctgaagcgcc cgcacccccg ggccctccc aggaggagg agaggcggag 1440
213 gaagcggcgg aggaggcccc ggaggaggcc ttgaggcggg tggtcgcct cctggggggg 1500
214 cgggtgctct gggcgcgcg gcccaggacc cgggaggcgc cggaggagga acccctgagc 1560
215 caagacgaga tagggggtac tggatatata 1590

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218 <210> SEQ ID NO: 4

219 <211> LENGTH: 464

220 <212> TYPE: PRT

221 <213> ORGANISM: Thermus thermophilus

223 <400> SEQUENCE: 4

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225   1           5           10           15
227 Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
228   20           25           30
230 Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
231   35           40           45
233 Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
234   50           55           60
236 Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg
237   65           70           75           80
239 Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser
240   85           90           95
242 Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu
243   100          105          110
245 Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser
246   115          120          125
248 Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro
249   130          135          140
251 His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro
252 145          150          155          160
254 Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu
255   165          170          175

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257 Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg
258      180      185      190
260 Glu Ala Glu Glu Glu Ala Leu Leu Leu Ala Arg Leu Ala Asp Gly
261      195      200      205
263 Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu
264      210      215      220
266 Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro
267 225      230      235      240
269 Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr
270      245      250      255
272 Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala
273      260      265      270
275 Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu
276      275      280      285
278 Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln
279      290      295      300
281 Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu
282 305      310      315      320
284 Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala
285      325      330      335
287 Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro
288      340      345      350
290 Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro
291      355      360      365
293 Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe
294      370      375      380
296 Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg
297 385      390      395      400
299 Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys
300      405      410      415
302 Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro
303      420      425      430
305 Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu
306      435      440      445
308 Gly Glu Lys Lys Lys Pro Glu Pro Lys Ala Pro Pro Gly Pro Thr Ser
309      450      455      460
315 <210> SEQ ID NO: 5
316 <211> LENGTH: 454
317 <212> TYPE: PRT
318 <213> ORGANISM: Thermus thermophilus
320 <400> SEQUENCE: 5
321 Met Ser Ala Leu Tyr Arg Arg Phe Arg Pro Leu Thr Phe Gln Glu Val
322 1      5      10      15
324 Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu
325      20      25      30
327 Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly
328      35      40      45
330 Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly
331      50      55      60

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Use of n and/or Xaa has been detected in the Sequence Listing.
 Review the Sequence Listing to insure a corresponding
 explanation is presented in the <220> to <223> fields of
 each sequence using n or Xaa.

VERIFICATION SUMMARY

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Input Set : A:\R10301.app

Output Set: N:\CRF3\01292002\I716964A.raw

L:567 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:17
L:1092 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:29
L:1124 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:30
L:1288 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:42
L:1320 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:43
L:1594 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:66
L:1617 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:67
L:1640 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:68
L:2282 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:89
L:2375 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:91
L:2378 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:91